

Interim report: Evaluating reuse options for past peatland extraction sites

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**MS-E2177 - Seminar on case studies in
operations research**

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1 Changes in objectives and scope

There have been two notable changes in the scope of the project. Firstly, regarding the decision making tool, the objective is now to create a tool with two versions of the decision making process: one a more rigorous process involving multi-attribute value theory (MAVT) to be used by experts in the field, and a simplified version to be used by landowners. The first phase of the decision making, i.e. the decision trees, is common to both versions. The simplified version, instead of giving numerical value to each reuse option, presents a decision matrix that indicates whether each reuse option has a positive or negative impact in each criteria.

Secondly, due to the loss of one team member, we are prioritising certain tasks over others to ensure the completion of the project. It is therefore possible that we will not test the tool with real data.

2 Project status

Below project status is summarised with the project tasks divided by completion status. Overall, the project is slightly behind the schedule defined in the project plan as the decision criteria value functions and weights are not fully defined.

2.1 Completed tasks

We have completed a literature review focusing on recent applications of Graphic Information System multi-criteria decision analysis (GIS-MCDA) to site selection for environmentally significant projects like landfills and renewable energy projects. Of main interest to us were the social criteria identified for use in the MCDA, the MCDA methods used, and the degree of stakeholder involvement in the MCDA process.

Based on the literature review, prior knowledge of MCDA, and the client's input the methods selected for use within the tool are decision trees, the weighted-sum method, and Pareto optimality.

The decision trees have been formed with exclusion criteria mostly gathered from existing guidance for peatland owners, most notably (2). At first the goal was to create a single decision tree as in (1), but as we are considering more reuse options and identified more exclusion criteria this became intractable. Instead, a primary decision tree was formed concerning the broader categories of reuse options: forestry, agriculture, wetland creation, and other reuse options. Then secondary decision trees were formed to examine the specific options within each category. The decision trees have also been implemented in Excel as part of a mock-up of the final decision making tool. The mock-up also includes rudimentary versions of other elements of the final tool and how they interact.

2.2 Current tasks

To implement the weighted sum method of decision making, we must define value functions for each decision criteria. Working from the list of criteria provided by the client, we are now defining these functions. Due to the nature of some of the criteria, some of these value functions are necessarily categorical, but we aim to define continuous value functions wherever possible. In some cases it is advantageous to consolidate several criteria into a single broader criterion to avoid unnecessary correlation between criteria or otherwise simplify the definition of the value function.

2.3 Remaining tasks

The weighted sum method typically requires that weights are elicited from the decision maker. The weights used in the decision making tool will be determined by the user via a weight elicitation framework we create within the tool. The weight elicitation method used is yet to be determined but the most rigorous methods like trade-off weighting have been ruled out due to the high number of categorical variables and the difficulty for the user.

Once the value functions and weight elicitation method are defined, the a fully functional version of the decision making tool will be implemented in Excel and the final report will

be completed.

3 Updated risk management plan

The reassessed risks of the project are in Table 1. The likelihood of all risks has diminished as the project has progressed.

Table 1: List of recognized risks associated with the project.

Risk	Likelihood	Effect / Impact	Mitigation of likelihood	Mitigation of impact
Difficulties in creating the advanced version based on the simplistic implementation	Low	Slow progress, in the worst case advanced version will not be finished.	Careful planning.	Re-scoping the project.
The simple version is too simple for the landowners	Low	The tool does not bring value to the users.	Estimates of impacts of different reuse options w.r.t all the attributes will likely be enough to bring value on its own. Gathering this information to one place is valuable on its own.	Expectation management.
Further loss of team members / team inactivity	Low	Increase of workload, delays	Open communication, a schedule everyone finds feasible.	Re-scoping and re-scheduling (requires us to be ahead of deadlines)

References

- [1] Padur, K., Ilomets, M., Põder, T. (2017). “Identification of the criteria for decision making of cut-away peatland reuse”. *Environmental Management*, 59(3), 505-521.
- [2] Salo, H., Savolainen, V. (ed.) (2008). “Turvetuotantoalueiden jälkikäyttö: Opas alan toimijoille”. Association of Finnish Peat Industries.